

A Possible New Neurological Mechanism.

Accounting for the existence of conditions such as post traumatic stress disorder, panic disorder, and anorexia nervosa is problematic. It would appear as if these conditions have been attributed to disease, disorder, or genetic abnormality almost by default, for why else would such destructive conditions exist? I believe that I know why. I believe that these, and a host of other negative conditions and states, are not caused by disease, disorder, or abnormality at all, I believe that they are, in fact, adaptations. In other words, I believe that they exist because they have actually created a survival advantage. In order to explain further, I believe that some background information is in order.

There is a model that can be useful in the understanding of our brains development, known as the triune brain theory. This model, which was developed by Dr. Paul MacLean, the former director of the Laboratory of Brain and Behavior at the United States National Institute of Mental Health, is based on the brains evolutionary development. In this model, the brain is viewed as consisting of three basic parts; it is, in effect, three brains in one. Each 'brain', or region, generally corresponds to a stage of our evolutionary development: reptilian, mammalian, and human, or primate. All are separate but interconnected, and each is equipped with its own unique response to threat. Each of these "brains" developed in succession, in response to evolutionary events and pressures. While this theory has proved to be somewhat problematic in dealing with the specifics of brain function, in that it is now known that certain of its functions have migrated as our brain has developed, it is still valuable in describing the basics of our brains evolutionary development.

The first, and oldest, part of our brain is reptilian region. It mainly consists of the brain stem and the cerebellum. This section of the brain is predominantly concerned with survival, including reproduction, defense, the search for food, and the functioning and maintenance of the physical body. Heartbeat, breathing, digestion, immunity, thirst, and sexual desire all originate here. The reptilian region is also responsible for the fight-or-flight response, a series of physical, mental, and emotional changes which prepare us to cope with danger, as well as the 'all-or-nothing' reptile response to threat. All of the behaviors of this section of the brain are automatic, instinctual, and highly resistant to change. The reptilian brain is concerned only with its own survival and well-being.

The next region to develop was the mammalian brain, otherwise known as the limbic region, which sits directly atop the reptilian region. This is the emotional brain. The mammalian brain initiated a new set of instincts, many of which were modifications and refinements of old reptilian drives. For example, since mammalian young arrive in a helpless and vulnerable state, and must be cared for by others, the reptilian drive for reproduction was augmented by the mammalian instinct for child rearing. The mammalian brain is also capable of experiencing much more complex emotions than the reptilian brain. When coupled with its ability to consider the needs of others, this allows it to function in social hierarchies. The mammalian brain determines valence, whether something is positive or negative, agreeable or disagreeable. For the mammalian brain, survival depends on the avoidance of physical and emotional pain, and the repetition of pleasure. It records memories of behaviors that produce good and bad results, and evaluates sensory experience in basic, general terms such as "good =

safe," and "bad = dangerous." It initiates the mammalian defense posture, which consists of menacing poses, facial grimaces, and threatening noises. Because the mammalian brain can link behavior with emotion, it has the ability to inhibit the reptilian regions automatic responses. It is also capable of controlling the fight-or-flight response.

The newest section of the brain is the cerebral cortex, also known as the primate brain, or human region. This is the intellectual brain. The cerebral cortex is present in some other highly intelligent mammals, notably whales, apes, and dolphins. Among other things, it is responsible for awareness, decision making, voluntary movement, attention, language, reading and writing, judgment, reasoning, imagination, and all conceptual thought, allowing us to imagine alternate and future realities, and to plan for future events. Thus, while less highly evolved mammals might experience fear, human beings are capable of worry. While a zebra cannot fear the predator that might appear at some future time, human beings are capable of imagining threats and dangers that do not yet exist and reacting to them almost endlessly. The cerebral cortex seldom deals with the environment directly, but with symbolic representations of it, both positive and negative. Both creativity and cooperation originate here, which allow human beings an incredible number of options and behavior choices, including the option to forego competition for the common good.

When the individual is exposed to threat or adversity, in all but the most severe cases, a component of the mammalian region inhibits the reptilian brains aggressive defenses. This ability developed in order to prevent these defenses from impeding the development of the much more flexible and efficient mammalian region. This was the result of these defenses' heavy consumption of bodily resources, especially oxygen and glucose, and the high levels of adrenalin they introduced into the blood stream, which constricted blood vessels and inhibited blood flow to the rest of the brain. Additionally, the reptilian brain, being located below the mammalian brain, is first in line for the bodies valuable resources, and when the reptilian brain perceives threat, it can attempt to keep all of these resources for itself, depriving the other parts of the brain. The ability to inhibit these costly defenses eventually allowed the much more sophisticated mammalian brain to develop new methods of dealing with threat that used far fewer resources than the reptilian brains defenses, such as the above mentioned mammalian defense posture. The reptilian brains defenses were not eliminated by this process, since they were an effective part of the individuals overall defenses, but were eventually relegated to the defenses of last resort.

I believe that a problem was created when the cerebral cortex developed the ability to imagine threats and dangers that had not yet occurred, since it is also possible, somehow through our brains inter-connections, for the reptilian brain to respond to these imagined threats and dangers just as if they were real. (This ability becomes especially pronounced after exposure to physical or emotional stress, threat, or harm, as the cerebral cortex attempts to predict future threats and dangers before they actually develop. From now on, I will refer to these imagined threats and dangers as "imagined threat.") I believe that this was problematic because imagined threat, unlike real threats and dangers, did not cause the mammalian brain to inhibit the reptilian brains costly defenses, at least not sufficiently. I believe that this was primarily due to the fact that the component of the mammalian brain that attaches valence to experience, and thus could have triggered inhibition of the reptilian brains defenses in response to imagined threat, functioned by receiving sensory input from outside the brain itself and comparing it to memories of past experiences. This process was well established, within much older parts of the brain, before future thinking, which is a very recent development, first occurred within the cerebral cortex. Because the brain is such a vast and complex structure, for two such far-flung and disparate functions to be able to access each other in such a brief amount of time, let alone to be able to communicate, would seem highly unlikely. Since the cerebral cortex is capable of dealing with threat almost endlessly, even when there is no actual threat stimulus present, this could have potentially exposed the reptilian brain to imagined threat for extended periods of time without causing the mammalian brain to inhibit its defensive responses. Eventually, I believe that this

would have caused the reptilian brains defenses to impede the evolutionary development of the cerebral cortex as they had previously impeded the development of the mammalian brain; through the introduction of excessive adrenalin into the blood stream, and through the excessive use of the bodies valuable resources. Any process that could have inhibited the reptilian brains defenses under these conditions would have given the individual the survival advantages that the subsequent increase in development of the cerebral cortex would have created.

I believe that there is a mechanism within our brain that can cause the mammalian brain to prevent imagined threat from causing the reptile brains defenses to impair the cerebral cortex's development. This mechanism becomes apparent in individuals who have experienced sufficient threat and adversity to cause the cerebral cortex to produce imagined threat for extended periods of time. It functions by exposing the individual to threat and adversity until such time that imagined threat from within the cerebral cortex is no longer likely to cause the reptile brains defenses to inhibit the cerebral cortex's development. It accomplishes this by negatively impacting the individuals thoughts, emotions, actions, behaviors, senses, and physical and mental states in ways that create threat and adversity that the mammalian brain is able to perceive, and to which it is able to respond by maintaining inhibition of the reptile brains defenses. I believe that conditions such as post traumatic stress disorder, panic disorder, and anorexia nervosa are but a few of the ways in which this mechanism can manifest itself.

While this mechanism has many obvious drawbacks, I believe that it functions in this manner because it has enabled it to develop within existing neurological systems and structures, allowing it to become viable with a minimum of physical adaptation. I believe that an alternative to this mechanism, eliminating the interconnection that allowed the reptilian brain to respond to imagined threat as if it was real, probably did not occur because this ability imparted certain survival benefits to the individual, and eliminating this interconnection would also have eliminated those benefits.

I believe that this mechanism is present and active in all of us, though in most of us usually at low enough levels to be overlooked, dismissed, or explained away. This is because its effects vary greatly in intensity and duration from one individual to the next, depending upon their physical, psychological, and genetic makeup, their personal life experience, their sensitivity to a given stimulus, and their history of exposure to threat and adversity. In some people its effects are barely noticeable, posing only the most minor of inconveniences, such as getting a song stuck in their head that they can't get rid of, starting an argument, or perhaps just having an "off" day, while in others, its effects can be completely devastating, as may be seen in post traumatic stress disorder, panic disorder, and anorexia nervosa.

Given the fact that the mammalian brain can function within social hierarchies, it is not only possible for it to assign valence to experiences that effect the individual directly, but also to experiences that effect others. This is beneficial because so much of our safety and security, as well as our very survival, can depend upon the cooperation and good will of others. Thus, in addition to exposing the individual to threat and adversity directly, I believe that this mechanism can expose them to threat and adversity by causing them to harm others and to violate social and personal codes of conduct, leading to loss of social benefit and status, as well as punishment, ostracism, retaliation, etc.

While I have until now focused largely on this mechanisms ability to increase threat and adversity, it is important to note that I believe that it can function by decreasing pleasure and safety, as well. I believe that this is possible because the mammalian brain, or the "emotional brain," tends to evaluate experiences and define their valence in basic, polar terms, such as "good = safe," and "bad = dangerous." Thus, both the presence of threat and adversity ("bad" experience) and the absence of pleasure and safety ("good" experience) will cause the mammalian brain to inhibit the reptilian brains defenses, since the mammalian brain depends upon the avoidance of physical and emotional pain ("bad = dangerous") and the repetition of pleasure ("good = safe") to insure the individuals safety and survival.

Thus, the mammalian brain can perceive the absence of safety and pleasure, as well as the presence of threat and harm, as representative of an increased threat to its survival, causing it to inhibit the reptilian brain's costly defenses.

This mechanism can compensate for increased levels of safety and pleasure in several different ways, including by increasing levels of threat and adversity. This can often be seen in drug and alcohol abuse, where this mechanism may compensate for the euphoria of the drug or alcohol experience by causing the individual to become abusive, violent, self-destructive, etc.

I believe that this mechanism can also respond to increased safety and pleasure by reducing or eliminating them, as I believe can be seen in anorexia nervosa. Usually, individuals who go on to develop this condition have a history of exposure to threat and adversity, often exhibiting feelings of inadequacy and hopelessness, and unrealistic expectations of themselves. They may also have been the victim of child sexual abuse. These individuals usually believe that they are unacceptably overweight, and that losing this weight will make a dramatic improvement in the way others view them, and the way that they feel about themselves. I believe that when it becomes apparent to them that they are indeed able to successfully lose weight, and thus begin to experience the positive feelings they had so greatly desired, this mechanism eliminates these pleasurable feelings by actually removing the individual's ability to perceive their own weight loss.

This mechanism can also decrease safety by making negative experiences appealing and pleasurable, and in so doing insure that these things will be voluntarily repeated. Compulsive thrill seeking, sadism, masochism, pedophilia, animal abuse, and even serial murder are some of the ways in which I believe this phenomenon can manifest itself. In those individuals who exhibit pyromania or self-injury, this mechanism may thus subject them to increased anxiety or dysphoria, and then later reduces them as a reward for the individual cutting themselves, setting a fire, etc., thus insuring that these behaviors will be repeated.

This mechanism can also increase threat and adversity by associating them with pleasurable experiences. Thus, it may cause sex to be more appealing if it is painful, violent, abusive, degrading, disgusting, self-destructive, etc. In problem shopping and problem gambling, this mechanism may cause the individual to become so obsessed with these things that they cannot stop indulging in them, thus exposing them to threat and adversity by creating hardship in their personal and financial lives.

The following is a partial list of the ways in which I believe this mechanism can manifest itself:

1. Emotional disorders: anorexia nervosa, bulimia nervosa, body dysmorphic disorder, certain obsessive-compulsive disorders, adjustment disorder, depressive disorders, anxiety disorders, including post-traumatic stress disorder, certain phobic disorders, acute stress disorder, rage attacks, personality disorders.
2. Stress-induced illnesses and conditions: diabetes, Cushing's syndrome, heart disease (six fold increase) and other stress-related heart conditions, functional gastrointestinal disease, fibromyalgia, chronic fatigue syndrome, rheumatoid arthritis, pain disorder, allergies, asthma.
3. Destructive, frightening or disturbing thoughts, emotions, behaviors: antisocial personality disorder, pyromania, child abuse, pedophilia, intrusion (intrusive thoughts, flashbacks), kleptomania, domestic violence, animal abuse, sadism, rape, murder, serial murder.
4. Self-destructive, self-abusive or self-defeating thoughts and behaviors: masochism, poverty and homelessness, prostitution, unsafe sexual practices, teen pregnancy, obesity, smoking, drug abuse, alcoholism, self-harm, problem gambling, problem shopping, various compulsive behaviors such as

compulsive overeating, compulsive thrill seeking, compulsive risk taking, compulsive over-exercising.

5. Virtually any experience, behavior, state, condition or circumstance which can be perceived or experienced as unpleasant, negative, frightening, dangerous or harmful, and which either potentially or actually effects the individual or those within the individuals sphere of influence. This may include: executive dysfunction, Tourette's syndrome, atypical facial pain, sensory integration dysfunction.

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